RESEARCH FRONT

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USE OF BIOFERTIZERS AND BIOPESTICIDES: A POTENTIAL TOOL OF SUSTAINABLE AGRICULTURE

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ABSTRACT:

The Productivity in Indian agriculture has seen a sharp increase in recent years due the use of Chemical pesticides and fertilizers with technological inputs. This modern intensification in productivity also cause adverse effects on human health, the ecosystem and ground water. After this prolonged dependence on inorganic and mineral components for agriculture growth there has been an increasing demand for rethinking agricultural growth strategy. Agriculture sustainability, soil degradation (soil productivity and soil structure) bio-diversity , impact on human health and on environment as a whole are the some of the concerns that are being raised for reviewing part of the agricultural growth potentials based on the current strategy. Search for alternates with a focus on long-term sustainability of agriculture has been enhanced in the last decade. It is therefore necessity that environmental friendly methods of improving soil fertility, pests and disease control are used. Biopesticides and Biofertilizers have emerged as a potential environment friendly inputs that are supplemented for proper plant growth. They hold vast potential in meeting plant nutrient requirements while minimizing the use of chemical fertilizers. Bio inputs with features like improve productivuty, cheap, ready availability, improving soil fertility, most importantly ecofriendly are of special concern. This paper describes nature, classification and application of biofertilizers and biopesticides

Keywords: Biofertilizers, Biopesticides, Agriculture, Micro-organism, Bioinputs

INTRODUCTION:

Modern agricultural techniques used secure the food requirement of huge Indian population. This improved agricultural production in the recent years is because of increase in the use of chemical fertilizers, Pesticides, farm machineries, better farm practices. With improving agriculture productivity, it caused detrimental impact on environment by affecting soil fertility, water hardness, development of insect resistance; increase pollution; misbalancing biodiversity, increase the toxic residue through food chain and animal feed. These pesticides are adversely affecting the human health. Pesticides can enter human body, brings a critical health problems to the people like skin cancer, embryo disorder. The another major hazard during the use of chemical fertilizers are ground water contamination. Nitrogen fertilizers breaks down to nitrates and travels easily through the soil and as they are water soluble they can remain in that position for decades and these accumulation is causing the problem. These accumulations of chemicals lead to water pollution both surface and ground water. Chemicals used in excess also cause soil degradation as essential microbes which improve soil quality get killed. So, it is of great concern and has to tackle immediately .One of the best way to minimize hazard is the use of biopesticides and biofertilisers. These are the microbes containing live or latent cells of efficient strains; such as bacteria, algae or fungi used for application to seed, soil or composting areas with the objective of increasing number of such microorganisms and accelerate those microbial processes which provide the nutrients

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that can be easily absorb by plants. Simply, these are called as bioinoculants which on supply to plants improve their growth and yield.

A Brief Account of Biofertilizer:

A biofertilizer are microbial inoculants which are artificially multiplied cultures of certain soil microorganisms that can improve soil fertility and crop productivity. Biofertilizers are mainly derived from soil of root zone. Biofertilizers are actually the compound that enriches the nutrient quality of the soil by using microorganisms that establishes symbiotic relationships with the plants. These microorganisms require organic matter for their growth and activity in soil and provide valuable nutrients to the plant. Biofertilizers actually fix the atmosoheric nitrogen to the soil and root nodule of legume plat. These micobes can solublise the phosphate and make available to plants. They can decompose organic matter and improve soil quality, Can generate anti-metabolites useful in root growth. Biofertlizers are generally classified as: nitrogen fixing and phosphate solubilising. Nitrogen fixing biofertilisers fix atmospheric nitrogen into forms which are readily useable by plants. These include Rhizobium, Azotobacter and Azospirillum, Blue Green Algae (BGA) and Azolla. While Rhizobium requires symbiotic association with the root nodules of legumes to fix nitrogen, others can fix nitrogen independently. Phosphate solubilizing micro-organisms such as Bacillus, Pseudomonas, Aspergillus etc. secrete organic acids which enhance the uptake of phosphorus by plants by dissolving rock phosphate. Naturally, the use of biofertilizers improve the yeild without any adverse effect on human health and environment. Biofertilizers is the renewable source improve productivity by 15-20 %. They help to maintain natural carbon: Nitrogen balance of soil; improve the structure and water holding capacity of soil; Solubilize and mobilize nutrients; Eco-friendly, nonpollutant and cost effective method.

These are having certain limitations like Non availability of appropriate and efficient strains of bacteria, self-life is short, lack of farmer awareness and difficult storage.

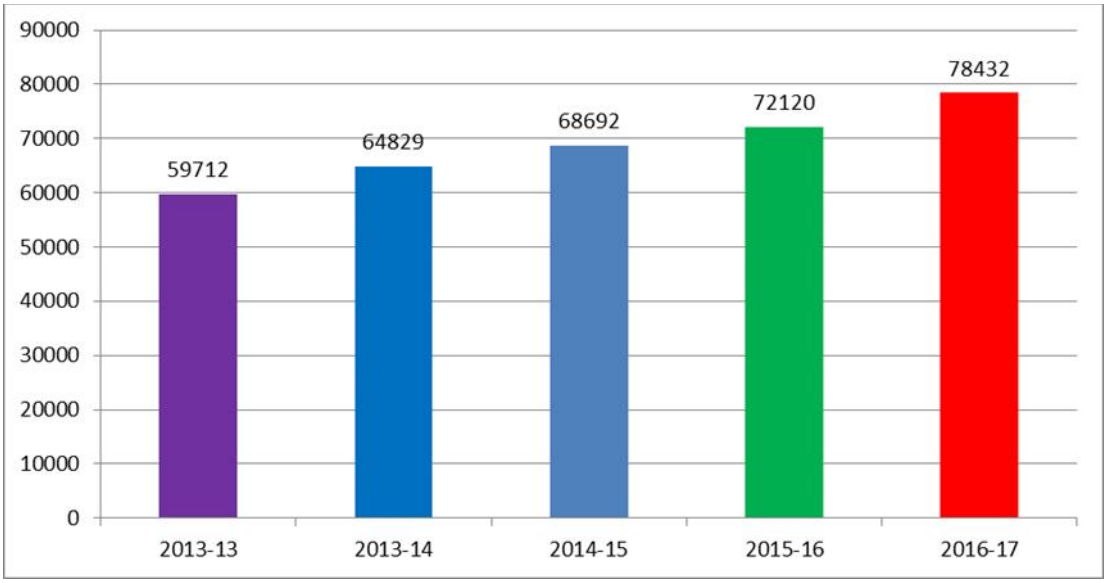

Fig. 1 Year wise use of chemicals and fertilizers in India

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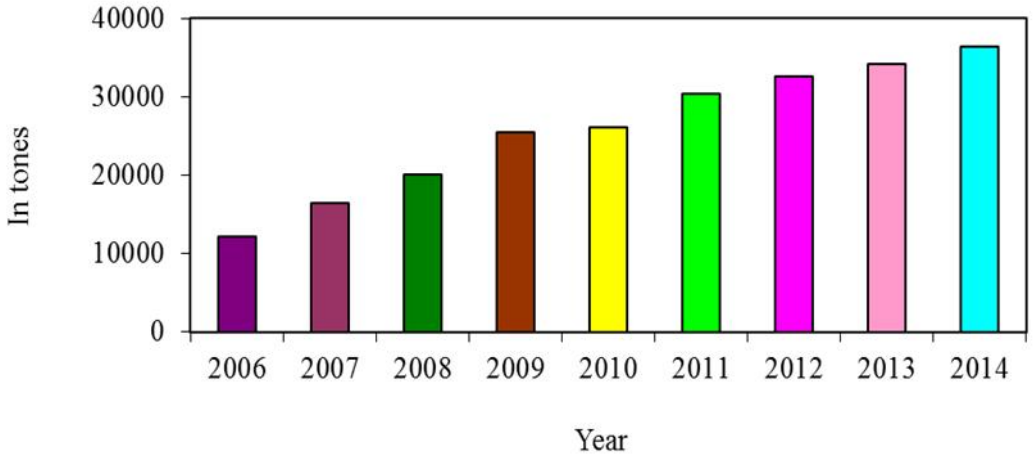
Sr No.	Bio-fertilizers	Recommended crops
1	Azolla, Blue green algae	Submerged Rice
2	Rhizobium	Pulses, Oilseeds, Fodder
3	Azatobacter	Rice ,wheat, cotton, vegetables, mustered, flowers
4	Azospirillum	Rice, wheat, millets, maize
5	PSM	All Crops

Table 1: Recommendations of different biofertilizers for various crops

The Fig. 2 shows the graph of increased use of Biofertilizers in India. It shows the increase in use of with years. The increase in use is linear change during period of 2006 to 2014.

Fig 2.Graph of increased use of Biofertilizers in India



A Brief Account of Biopesticides:

Biopesticides are mainly of two types as Microbial pesticides and Biochemical pesticides. Microbial pesticides consist of microorganisms (e.g., a bacterium, fungus, virus or protozoan) as the active ingredients. They are derived from such natural materials as animals, plants, bacteria, and certain minerals. Microbial pesticides can control many different kinds of pests. Subspecies and strains of *Bacillus thuringiensis* or Bt are the most widely used microbial pesticides. Protein mixture generated by different strains kill insect larvae. Bt's control moth larvae found on plants, other Bt's are specific for larvae of flies and mosquitoes. The target insect species are determined by whether the particular Bt produces a protein that can bind to a larval gut receptor, thereby causing the insect larvae to starve. Plant-Incorporated-Protectants (PIPs) are pesticidal substances that plants produce from genetic material that has been added to the plant. For example, scientists can take the gene for the Bt. pesticidal protein, and introduce the gene into the plant's own genetic material. Then the plant, instead of the Bt. bacterium, manufactures the substance that destroys the pest. Biochemical pesticides are naturally occurring substances that mainly consist plant extract, fatty acids, pheromones that control pests by non-toxic mechanisms. Bio pesticides are less toxic than conventional pesticides. Bio pesticides generally affect only the target pest and

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closely related organisms, in contrast to broad spectrum, conventional pesticides that may affect organisms as different as birds, insects, and mammals. Bio pesticides often are effective in very small quantities and often decompose quickly, thereby resulting in lower exposures and largely avoiding the pollution problems caused by conventional pesticides. Biopestcides are effective with some limitations like instability of the protection effect, short lived activity and difficulty in establishment of the biopesticide agents in the fields, Low potency and High cost of production.

CONCLUSION:

Biofertilizers and biopesticides are useful to improve agricultural production.They are of environment friendly and low cost agricultural inputs. .Among the biofertilizers Azotobacter, Azospirillum and Acetobacter are the important for nitrogen fixation, *Bacillus* sp. and *Aspergillus* sp. are important for phosphate solubilisation. The use of biofertilizers is needed to improve the soil structure, texture and natural compostion so as to maintain fertility of soil. Biopestices are less toxic, target specific and biodegradable .It's use is also accompanied with problems such as storage, transportations, and awareness. From this it conclude that Bioinputs are absolutely necessary in improving agricultural productivity and developing sustainable agriculture.

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